

1. A method for recursive ray casting, the method comprising:
providing a ray bundle of a selected position, direction and size;
conducting a proximity test of a selected proximity at the selected position; and
advancing the ray bundle a first casting distance when the proximity test is
negative.
2. The method of claim 1, wherein the first casting distance corresponds to the
selected proximity.
3. The method of claim 1, wherein the size of the ray bundle corresponds to the
selected proximity.
4. The method of claim 1, further comprising advancing a second casting distance
when the proximity test is positive.
5. The method of claim 1, further comprising retreating a second casting distance
when the proximity test is positive.
6. The method of claim 1, further comprising subdividing the ray bundle into child
bundles when the proximity test is positive.
7. The method of claim 6, further comprising traversing and subdividing until each
child bundle is a single ray.

1 8. The method of claim 6, wherein subdividing comprises partitioning along the
2 largest ray bundle dimension.

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4 9. The method of claim 6, wherein subdividing comprises partitioning along each
5 ray bundle dimension.

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8 10. The method of claim 6, further comprising combining child bundles of a
9 subdivided ray bundle when the proximity test of the ray bundle is negative.

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11 11. The method of claim 1, wherein the proximity test comprises testing boolean
12 flags.

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14 12. The method of claim 1, wherein the proximity test comprises accessing a distance
15 grid.

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18 13. The method of claim 1, wherein the proximity test comprises accessing a list of
19 proximate objects.

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17. The apparatus of claim 16, wherein the pixel set is defined by an area selected from a scanline span, a rectangle, and a triangle.

1 18. The apparatus of claim 16, wherein the occlusion detector is configured to operate
2 at a lower depth resolution than the bundle caster.

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4 19. The apparatus of claim 15, wherein the bundle caster comprises at least one
5 register file, each register file thereof coupled to an ALU.
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8 20. The apparatus of claim 15, further comprising a collision tester configured to
9 receive a ray position and provide a second hit signal indicating whether the ray position
10 is on or within the graphical object.
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12 21. The apparatus of claim 20, further comprising a ray caster configured to advance
13 the ray position.
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15 22. The apparatus of claim 21, wherein the ray caster comprises at least one register
16 file, each register file thereof coupled to an ALU.
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19 23. The apparatus of claim 22, wherein the ray caster is operably connected to the
20 occlusion detector.
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1 24. The apparatus of claim 23, wherein the occlusion detector comprises:
2 a z-buffer configured to store an occlusion depth for each of a plurality of pixels,
3 the occlusion depth being a low resolution representation of pixel depth;
4 a register configured to receive a pixel set descriptor describing a set of pixels
5 including a minimum depth for the set; and
6 a comparator configured to access the z-buffer and compare the minimum depth
7 with the occlusion depth for each pixel within the set of pixels.
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